REMARKS

Claims 1 –27 are pending in the application. Claims 1, 10, and 19 have been amended, leaving Claims 1-27 pending in the application. No new matter is added.

Claim Objections

Claim 19 has been amended to properly claim "surfaces are" as best understood by the suggestion of the Examiner. It is respectfully pointed out that the Examiner mistakenly suggested inserting "area" after "surfaces" in the Detailed Action.

Claims 1-18 and 22-27 stand rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

More specifically, the Examiner alleges that the recitation of "or proximate thereto" in claims 1 and 10 was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

No new matter is introduced by this amendment, since the application as a whole and the various embodiments disclosed in particular teach this aspect of the invention. "[M]atter added that makes explicit that which was implicit, inherent, or intrinsic in the original disclosure is not new matter and is permitted". 35 U.S.C. § 132. Furthermore, "conformation of one part of the disclosure to another portion thereof is clearly permissible." 37 C.F. R. 1.117. Since Applicants have disclosed "terrestrial" examples of various embodiments wherein "terrestrial" is an inherent feature of the embodiments disclosed, Applicants are permitted to later amend the Application to recite the inherent feature without introducing new matter. *In re Smythe and Shamos*, 178 U.S. P.Q. 279, 285-286 (C.C.P.A. 1973). Furthermore, it is respectfully noted out that a dictionary found at m-w.com defines terrestrial as "**1 a : of or relating to the earth or its inhabitants**." (Emphasis added.) It is respectfully submitted that the recitation "includes objects on the surface of the earth and proximate thereto" inherently reads on the above definition for "terrestrial," as disclosed in the originally filed application. Specifically, the application as filed states "[t]his

cooling effect at the surface of the earth (or wherever the device is located in a terrestrial setting) . . . ." Page 10, line 20. In addition, "[t]he placement of the presently invented device **on terrestrial surfaces** . . .," reads on includes objects on the surface of the earth and proximate thereto, as claimed in Claim 1.

Moreover, satisfaction of the description requirement under 35 U.S.C. § 112, first paragraph ensures that claims presented subsequent to the filing date of the application was sufficiently disclosed at the time of filing, so that the prima facie date of invention can fairly be held to be the filing date of the application. *See, Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1562, 19 U.S.P.Q.2d 1111, 1115 (Fed. Cir. 1991). In order to determine whether an application meets the "written description" requirement with respect to later-filed claims, the application need not describe the claimed subject matter in exactly the same terms as used in the claims, *in re Lukach,*, 442 F.2d 967, 969, 169 U.S.P.Q. 795 (C.C.P.A. 1971). It must simply indicate to those of ordinary skill in the art that as of the filing date the applicant had invented what is now claimed. *Id.*, at 1563, 19 U.S.P.Q.2d at 1116; see *In re Wertheim*, 541 F.2d 257, 191 U.S.P.Q. 90, (C.C.P.A. 1976). Accordingly, rejection with respect to Claims 1 and 10 should be withdrawn.

Claims 19-21 stand rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The Examiner alleges that the specification, while being enabling for an electricity generating device comprising a third junction surface disposed in contact with a first and second junction surface and providing a temperature difference between the first and second junction that is different from the third so as to produce a thermoelectric potential, does not reasonable provide enablement for an electricity generating device wherein a thermoelectric potential is produced without a junction between the first and second junction. Furthermore, the Examiner alleges that the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make or use the invention commensurate in scope with claim 19.

The Examiner is respectfully directed to Figures 1-5, 7, 9-11, and 13 which show

examples of how to produce the device. For example with reference to Figure 1, there are two junctions 11 and **one** junction 12. Thus, revealing three junctions. It is respectfully submitted that there is nothing in the laws of nature or physics that mandates the two junctions 11 will be at the same exact temperature. Both junctions 11 will be colder than (due to radiation cooling) than junction 12. Therefore, electricity will be produced by the thermoelectric generator as disclosed. Accordingly, it respectfully submitted that the Examiner improperly asserts that a junction must exist "between the first and second junction."

Claims 1-7, 9-14, 16, 18, 22, 24-27 stand rejected under 35 U.S.C. 102(b) as being anticipated by Chang et al. (5,405,680).

The Examiner alleges with respect to Claims 1 and 10 that Chang et al. disclose in Figures 3 and 4 a method of radiating thermal energy from a terrestrial position into deep space, and a device for transmitting thermal energy from an object into deep space comprising arranging a thermal energy transmitting material (coating 14) over an object (window 12 of automobile 10); and positioning the thermal energy transmitting material so that a transmitting surface thereof faces deep space, wherein the object includes objects (vehicles and building structures) on the surface of the earth and proximate thereto.

The Examiner further alleges that the material of Chang et al. would inherently provide the claimed spectral surface properties as the material of Chang et al. and is the same as that disclosed in the instant case, which allegedly discloses a material characterized by high thermal emissivity in the 8-13 μm wavelength region.

It is respectfully noted that Chang et al. teach a selective emissivity **coating that** is provided **for interior temperature reduction of an enclosure** such as vehicles or buildings. Col. 3, lines 47-49 and Abstract. The coating may be applied to the exterior surface of vehicle and building windows, or to the exterior, non-window surfaces of building structures. For the latter, the coating may take the form of a conventional paint to which is added tiny particles of the semimetal and selective emissivity materials to achieve the radiative cooling and reflection of incident infrared radiation. See Abstract. The material serves to reduce the **solar heat load** by reflecting the incident solar infrared radiation. Thus, Chang et al. teach a **fixed** coating applied to an object, such as a vehicle or building, to reduce the temperature of a closed space heated by

solar energy. Chang et al. teach only reducing temperature in an enclosure resulting from solar energy.

Chang et al. do not teach or suggest arranging a thermal energy transmitting material over an object, said thermal energy transmitting material configured and removably positioned to remove **waste heat** proximate said object thereby **reducing thermal pollution**, as in amended Claim 1. Thus, it is respectfully submitted that Claim 1, and the claims depending from Claim 1, i.e., 2-9, 24 and 26, define over Chang et al.

Moreover the Examiner alleges that with respect to Claim 2 that Chang et al. disclose in the abstract that the material may be applied to the exterior, non-window surfaces of building structures which would inherently provide for covering the object with transmitting material only at intervals during which the object is not in direct sunlight. It is respectfully submitted that the Examiner misinterprets the teaching of Chang et al. with respect to the coating applied to non-window surfaces. More specifically, Chang et al. teach that the coating may take the form of a **conventional paint** to which is added tiny particles of the semimetal and selective emissivity materials to achieve the radiative cooling and reflection of **incident infrared radiation**. It will be recognized by one skilled in the art that the incident infrared radiation is a result of incident solar energy from the sun. Thus, Chang et al. do not teach or suggest that the object is covered with the transmitting material **only at intervals during which the object is not in direct sunlight**, as in Claim 2. Thus, Claim 2 defines over Chang et al. for the above reason as well.

As for Claim 10, which is similar to Claim 1, it is respectfully submitted that Chang et al. do not disclose, nor make obvious, a thermal energy transmitting material designed to cover an object and positioned with a transmitting surface thereof facing deep space, said thermal energy transmitting material configured and removably positioned to remove waste heat proximate said object thereby reducing thermal pollution. As discussed above with respect to Claim 1, Chang et al. is limited to a fixed material on an enclosure to reduce the temperature therein resulting from incident solar energy. Chang et al. teach a different solution to a different problem. Thus, it is respectfully submitted that Claim 10, and the claims which depend from Claim 10, i.e., Claims 11-18, 22, 23, 25, and 27, define over Chang et al.

Claims 15 and 23 stand rejected under 35 U.S.C. 103(a) as being unpatentable over

Chang et at. as applied to claims 1 and 22, respectively, above, and further in view of Steams.

The Examiner admits that Chang et al. do not disclose that the thermal transmitting material is disposed within a pressure cell having a pressure less than ambient. However, the Examiner states that Steams in Figure 4 discloses thermal transmitting material (58 and 64 of aluminum) disposed within a pressure cell having a pressure less than ambient (gas-tight, transparent envelop 72). The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Change et al. by using the pressure cell of Steams because Steams discloses a pressure cell that would have prevented hot junctions from being cooled by convection thereby improving the overall performance of the method.

It is respectfully noted that Claims 15 and 23 depend from Claim 10 which is allowable for defining over Chang et al. as discussed above. It is further respectfully noted that the use of pressure cell of Steams does not cure the deficiencies noted above with respect to Chang et al. Thus, Claims 15 and 23 define over Chang et al. in view of Steams.

Claim 19 stands rejected under 35 U.S.C. 102(b) as being anticipated by Steams. The Examiner alleges that Steams in Figures 4 discloses a device for use in the earth's atmosphere wherein a first junction surface in thermal contact with solar energy (52;); a second junction surface in thermal contact with an object located at about a surface of the earth or proximate thereto (col. 3, lines 9-45 discloses one surface perpendicular to solar radiation and the opposite surface as the lower surface facing earth); and an electricity generating cell intermediate the first and second junction surface (semiconductor material disposed between the first and second junction surfaces); wherein the first and second junction surfaces are at a temperature different from each other producing a thermoelectric potential between first and second junction surfaces (col. 1, lines 43-58 which discloses producing electrical energy when one of the junctions is at a higher temperature than the other).

Steams teaches a solar power source that includes a first surface for absorbing solar energy and converting it into thermal energy, and a second surface spaced from the absorbing surface for radiating energy. At least one pair of dissimilar thermoelectric elements is disposed between and connected to both the absorbing surface and the radiating surface. Conductors are

provided for connecting the thermoelectric elements to an external load. Col. 1, lines 43-51. In the illustrated embodiment, the solar power source is disposed so that one surface thereof is generally perpendicular to the solar radiation (indicated by the arrows 26). For purposes of explanation, this one - surface is referred to as the upper surface and the opposite surface of the solar power source is referred to as the lower surface. Col. 2, lines 39-45. Furthermore, the uppermost layer 28 is composed of a material having a high absorptive power for the solar spectrum and **a low thermal emissivity**, such as molybdenum, -tungsten, tantalum, etc. Col. 2, lines 47-51.

In summary, Stearns teaches using thermoelectric generators (TEGs) to produce electric power during the day heated by solar energy using the upper surface in thermal contact with solar energy. The upper surface has a high absorbtivity in the solar spectrum and a low thermal emissivity. In contrast, the applicants teach a material having a high thermal emissivity facing skyward. Hence, the devices taught by applicants and in Stern contrast having surfaces with opposite spectral properties. More specifically, Stearns does not teach or suggest, and in fact teaches away from, a first junction surface in thermal contact with one of deep space and solar energy, said first surface having a high thermal emissivity toward the atmosphere of the earth, as in amended Claim 19.

Thus, it is respectfully submitted that Claim 19, and the claims depending from Claim 19, i.e., 20 and 21, define over Stearns.

Claims 20 and 21 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Stearns as applied to claim 19 above, and further in view of Gomez (4,251,290).

The Examiner alleges that Stearns discloses in Figure 2 a first semiconductor materials (semiconductor bars 10 or 14) disposed between the first junction surface (12) and the second junction surface (16 or 18) having a first semiconductor material having a straight geometry. The Examiner admits that Stearns does not disclose that the first semiconductor material has a geometry which increases thermal resistivity as set forth in claim 20, and wherein the geometry is curved, coiled, snaking, or a combination thereof as set forth in claim 21.

The Examiner also alleges that Gomez in Figures 1-5 discloses a first semiconductor material (20 or 40 or 50) having a geometry which increased thermal resistivity (minimizes heat

transfer) wherein the geometry is curved or snaking (i.e., square C shaped or squared Z shaped).

The Examiner then concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the device of Stearns by replacing the first semiconductor material with the first semiconductor material of Gomez because Gomez teaches a semiconductor material which has advantageous physical construction to enhance the generation of electricity by reducing the resistance in the thermocouple electrical path and minimize the loss by enlarging the area subjected to heat thereby improving the overall efficiency of the device.

It is respectfully noted that Claims 20 and 21 depend from Claim 19 which is allowable for defining over Steams as discussed above. It is further respectfully noted that the use of the first semiconductor material having a geometry of Gomez does not cure the deficiencies noted above with respect to Sterns. Thus, Claims 20 and 21define over Steams in view of Gomez.

Claims 8 and 17 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. as applied to claims 1, 10, 11, and 16 above, and further in view of Altman (4, 147,040).

The Examiner alleges that Altman discloses a spectral substance (infrared radiation transmitting material) selected from the group consisting zinc sulfide and zinc selenide.

The Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Chang et al. by using the spectral substance of Altman because Altman teaches a spectral substance that would have provide for a continuous, uninterrupted and unobscured flow of heat form a subject surface to a heat sink and through a heat conduit thereby improving the overall method for cooling a subject thermal load that emit infrared radiation.

It is respectfully noted that Claims 1 and 10 including claims depending therefrom, i.e., 8 and 17, respectively, define over Chang et al. as discussed above. It is further respectfully noted that the use of the spectral surface of Altman does not cure the deficiencies noted above with respect to Chang et al. Thus, Claims 8 and 17 define over Chang et al. in view of Altman.

It is believed that the foregoing remarks fully comply with the Office Action. Therefore, having placed the claims in an allowable condition, reexamination and allowance of claims 1-27

are respectfully requested.

If there are any charges with respect to this amendment, or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicant's attorneys.

Respectfully submitted,

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Version with markings to show changes made.

In the Claims:

A marked up version of the claims follows:

CLAIM 1. (amended twice) A method for radiating thermal energy from a terrestrial position into deep space comprising:

arranging a thermal energy transmitting material over an object, said thermal energy transmitting material configured and removably positioned to remove waste heat proximate said object thereby reducing thermal pollution; and,

positioning said thermal energy transmitting material so that a transmitting surface thereof faces deep space, said material having spectral surface properties of high emissivity in a spectral band substantially transparent to the atmosphere of the earth, wherein said object includes objects on the surface of the earth and proximate thereto.

CLAIM 10. (amended twice) A device for transmitting thermal energy from an object into deep space comprising:

a thermal energy transmitting material designed to cover an object and positioned with a transmitting surface thereof facing deep space, said thermal energy transmitting material configured and removably positioned to remove waste heat proximate said object thereby reducing thermal pollution, said transmitting material having spectral surface properties of high emissivity in a spectral band substantially transparent to the atmosphere of the earth, wherein said object includes objects on the surface of the earth and proximate thereto.

CLAIM 19. (amended twice) An electricity generating device for use in an environment having an ambient pressure, comprising:

a first junction surface in thermal contact with one of deep space and solar energy, said first surface having a high thermal emissivity toward the atmosphere of the earth;

a second junction surface in thermal contact with an object located at about a surface of the earth or proximate thereto; and

an electricity generating cell intermediate the first and second junction surfaces;

wherein the first and second junction surfaces are at a temperature different from each other producing a thermoelectric potential between the first and second junction surfaces.